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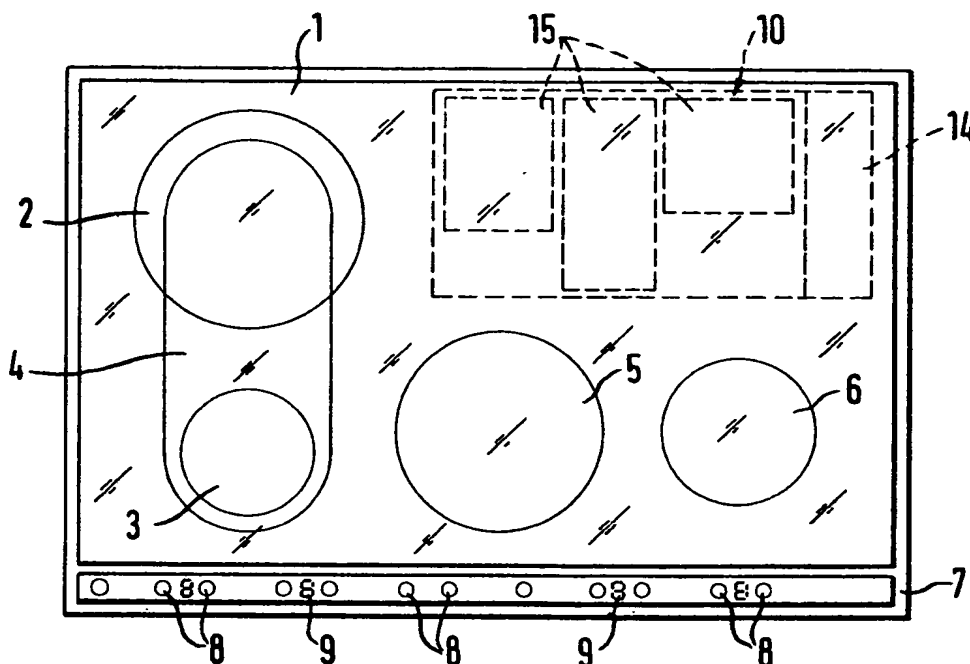
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(10) remote from these operating elements. The control means (10) is arranged, for example, underneath the deposit region for cooking vessels under a glass ceramic plate (1) or in the region of a remote control panel for the cooker hob which is for example, a component of a cooker. Indicating elements (9) are also arranged in the narrow side region.

## (54) Cooker hob

(57) A cooker hob comprises operating elements (8) arranged in a narrow side region of the hob, the operating elements (8) being constructed in the manner of push-buttons and connected through electrical lines with control means

FIG. 1



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FIG. 1

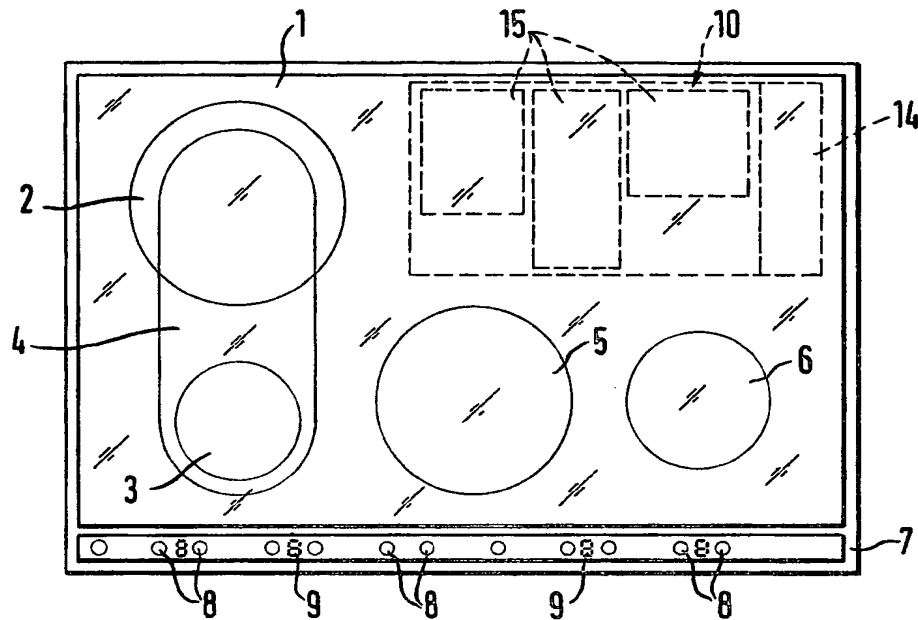


FIG. 4

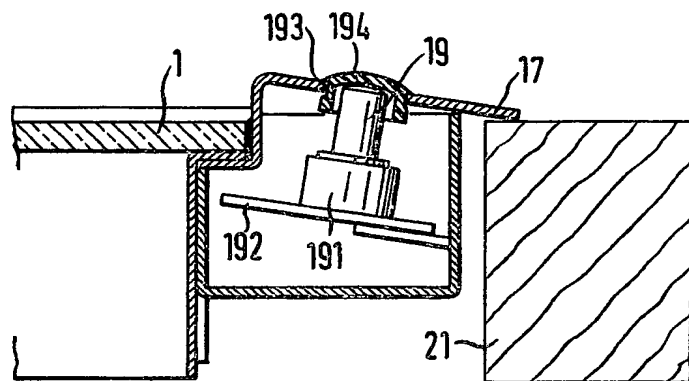
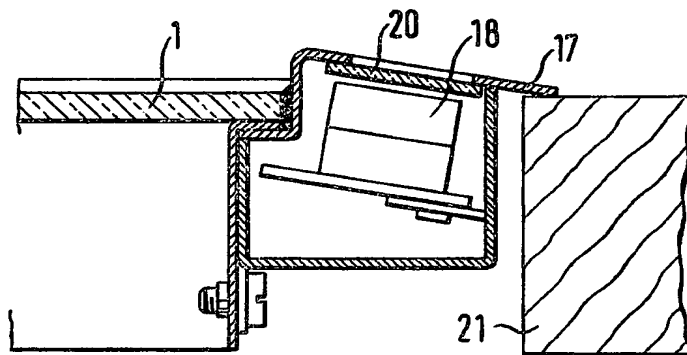


FIG. 5

FIG. 2

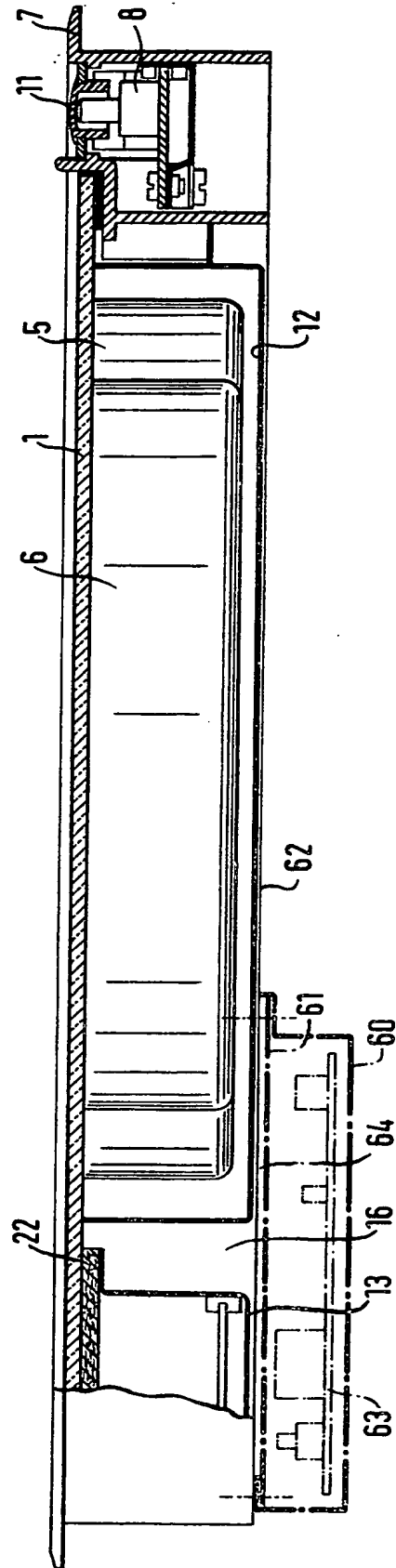


FIG. 3

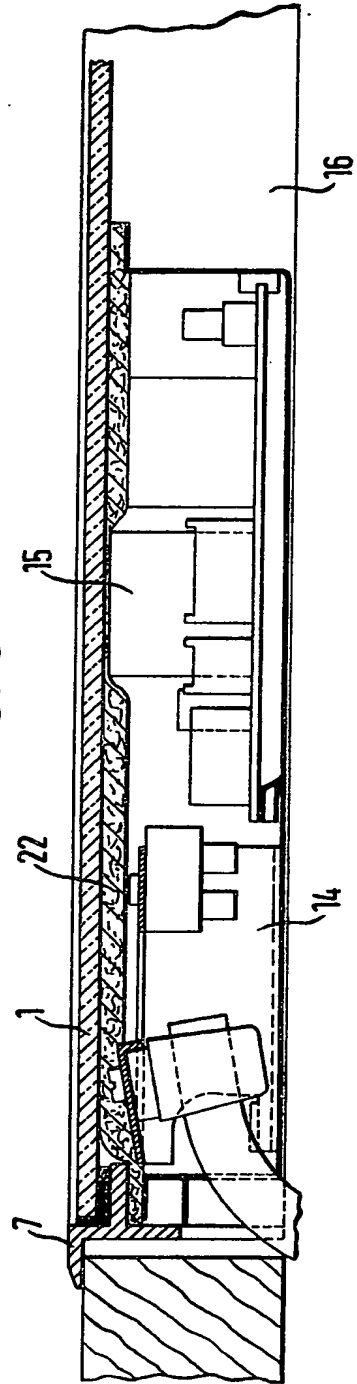


FIG. 6

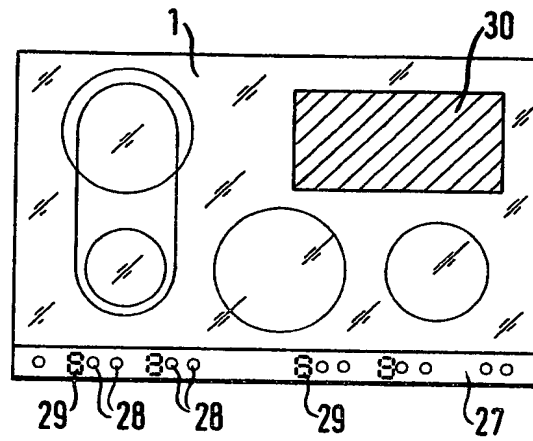


FIG. 7

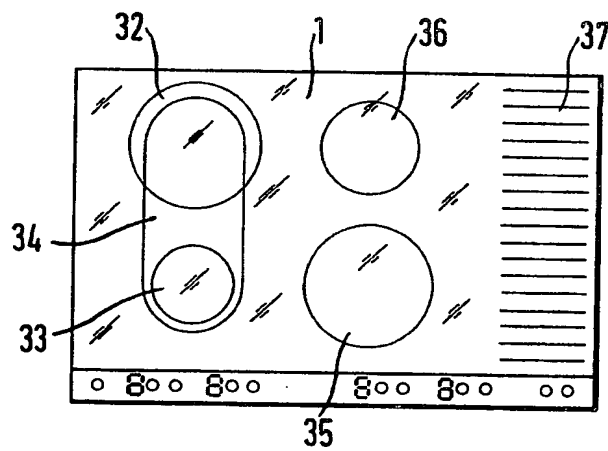


FIG. 8

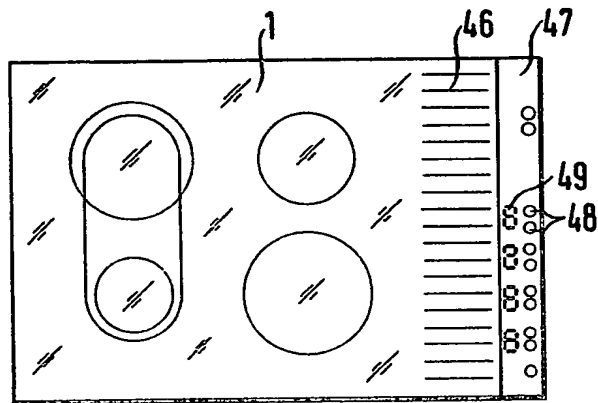


FIG. 9

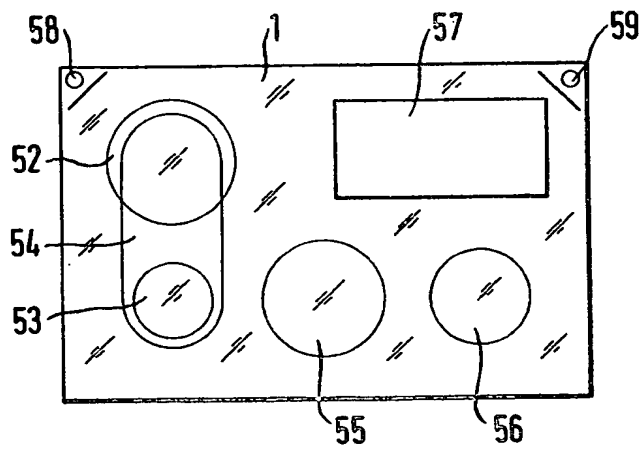


FIG. 10

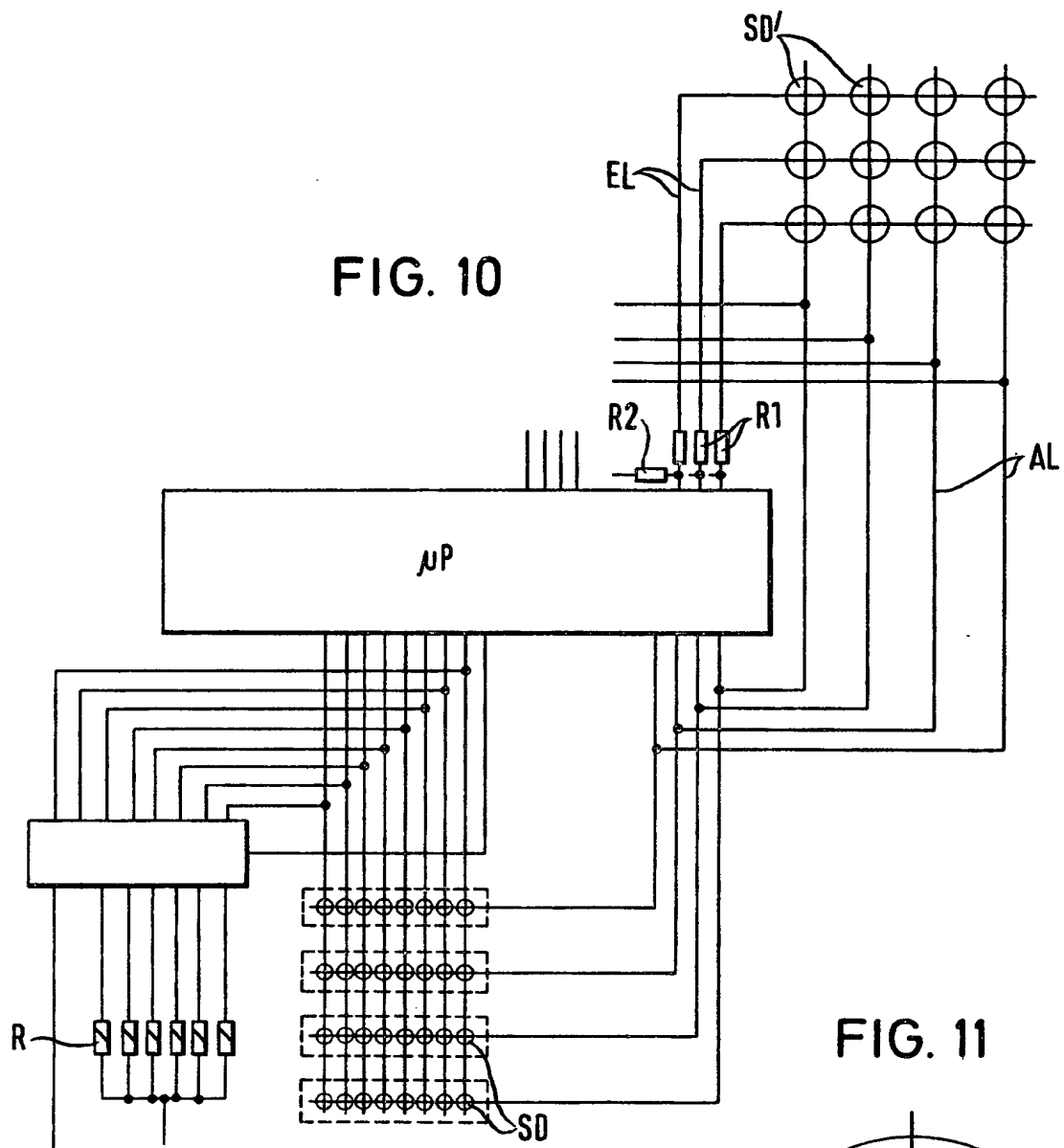
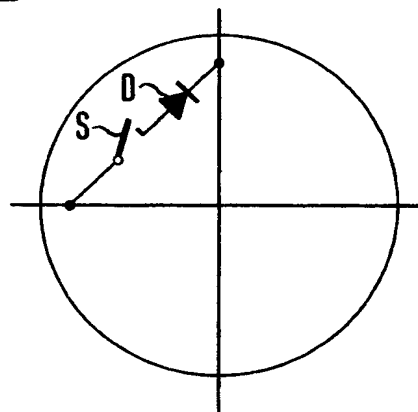


FIG. 11



## SPECIFICATION

### Cooker hob

5 The present invention relates to a cooker hob, and has particular reference to a glass ceramic cooker hob with several heating zones and with operating elements which are associated with at least one of these heating zones, such  
10 elements serving for the switching on and off and for the control of the heating power of the same and being arranged at the hob edge region and being a functional component of control equipment.

15 The setting of the heating power in known cooker hobs usually takes place through rotary switches. These rotary switches act mechanically on contacts, which drive the heating elements of the individual cooking regions, or  
20 on resistance bridges, which influence an electronic control circuit, from which in turn the heating power of the individual cooking regions is controlled. These rotary switches can also be replaced by slide switches with  
25 functions of like kind. For the arrangement of rotary switches as well as of slide switches, it is necessary to make sufficient space available for the operating region.

It is also known to employ touch-sensitive  
30 operating elements for the input of control values for the heating power control in cooker hobs. The application of measures of that kind is, however, at present still very difficult. A substantial problem with this form of input is  
35 the unreliability for the input of the functions. For that reason, the input procedure must be performed very carefully and be well monitored. Moreover, the danger exists of an unintended input. Various measures are known for  
40 the avoidance of these disadvantages, but these measures are mostly expensive to realise and are only partially successful. The relatively large space required for touch-sensitive input elements represents further problems, particularly since at least a part of the connected  
45 electronic system must be arranged near to these input elements in order to reduce induced disturbances by way of the lines between input surface and evaluating electronic  
50 system to a lowest possible level.

It is becoming more and more common to incorporate completely or partially self-contained cooker hobs, particularly glass ceramic  
55 cooker hobs, in kitchen working surfaces. This means that the operating and indicating elements for the heating power control of the individual heating regions should be a part of the cooker hob. The space which must be available for the operating and indicating  
60 elements is inevitably absent for the working surface, i.e. for the heating surfaces or deposit areas.

There is accordingly a desire for a cooker  
65 hob arrangement which, to optimise the working area of the hob, contains space-

saving operating elements which are, nevertheless, part of the hob, wherein it is ensured that the operating procedures can be performed consistently accurately and simply.

70 According to the present invention there is provided a cooker hob comprising means defining a plurality of heating zones, and at least one operating element associated with at least one of the zones for control of the heating  
75 thereat by way of heating power control means, said at least one operating element comprising a push-button arranged in a narrow region of the hob and the control means being arranged in a position remote from that  
80 of the operating element and being connected thereto by electrical conductor means.

Preferably, one or more operating elements constructed as push-buttons is or are arranged on at least one narrow region of the hob and  
85 control equipment for the heating power control is arranged remote from the operating elements constructed in the manner of push-buttons and is connected through electrical lines with the push-buttons.

90 A cooker hob embodying the present invention may have the particular advantage, compared with the known hobs, that the region to be made available on the hob for the operating elements can be kept small. Push-buttons  
95 in themselves require only a small operating space. At the same time, however, they offer the advantage that the current that can be switched through them can be conducted relatively long distances over electrical conductor  
100 lines without the risk of interference due to stray induction. As a result, it is possible to arrange an electronic control system for the heating power control remote from the push-button input elements, for example in a location where, for other constructional reasons,  
105 the required space is already available or can be created.

Expediently, the operating element or elements constructed in the manner of push-  
110 buttons is or are arranged in one or more edge regions of the cooker hob. For preference, these operating elements are arranged in a cover frame of the cooker hob. In the region of these operating elements, the frame,  
115 which is often only one to two centimetres wide, need be only slightly enlarged in order to receive the operating elements.

Preferably, the input elements are arranged in pairs and an indicating display is associated  
120 with each pair. It is thereby possible to set the heating power individually as for pressure-sensitive input panels and to directly vary the value upwardly and downwardly. It is expedient to arrange the respectively associated  
125 indicating field between the input elements of each pair.

Preferably, an unheated deposit area, underneath which the control equipment is arranged, for cooking utensils is provided on the  
130 hob upper surface. It is expedient in this

connection to provide a heat protection layer between the control equipment and deposit area and to arrange the heating devices, which are associated with the cooking zones and placed underneath the hob surface, in heat-insulating, trough-like containers. Advantageously, a heat-retarding space is provided between the containers on the one hand and the control equipment and/or the operating elements on the other hand.

Preferably, the control equipment is associated directly with the cooker hob, for example in the region underneath the deposit area within an otherwise unutilised space.

If so desired, standard operating elements for the heating power control may be arranged in a separate operating panel, with one or more operating elements constructed in the manner of push-buttons for the input of special functions being arranged in one or more narrow regions of the cooker hob. It is generally usual to associate standard operating elements for the heating power control with the cooker or to arrange them in an individual panel. The control circuit then normally lies within the region of these standard operating elements. This control circuit is connected through current-conducting electrical lines with the heating elements of the individual heating regions of the hob. In the case of a special construction of the hob, additional functions can be put in by way of additional input elements. These additional input elements can be integrated into the cooker hob itself in a space-saving and functionally reliable manner.

For preference, switch contacts of input elements constructed in the manner of push-buttons are arranged to bridge over lines of a functional conductor matrix at the intersections. By means of decoupling diodes connected in series within the switching bridges, a decoupling of these bridges is provided. Through the use of such a matrix, the expense for the electrical lines is reduced. Moreover, this measure also meets the conditions connected with the use of a microprocessor for control purposes.

In order to protect the inputs of such a microprocessor against overloading, resistance elements are expediently included in the line conductors near the microprocessor inputs. The inputs of the microprocessor are preferably subjected, through further resistance elements, to a defined reference potential so that specific signals states always prevail at these inputs.

Embodiments of the present invention will now be more particularly described with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a first glass ceramic cooker hob, with heating regions as well as input and indicating elements, embodying the invention;

Figure 2 is a sectional side view, to an enlarged scale, of the hob of Fig. 1 in the region of the input elements;

Figure 3 is a sectional side view, to an enlarged scale, of the hob of Fig. 1 in the region of electronic control means of the hob;

Figure 4 is a sectional view, in the region of an indicating device, of a second cooker hob embodying the invention;

Figure 5 is a sectional view, in the region of an actuating element, of the hob of Fig. 4;

Figures 6 to 9 are each a plan view of a respective further cooker hob embodying the invention;

Figure 10 is a schematic diagram of a driving circuit for heating power control means of a cooker hob embodying the invention; and

Figure 11 is a detail of the circuit according to Fig. 10 in the region of an intersection point in an input matrix of this circuit.

Referring now to the drawings, there are shown various embodiments of cooker hobs, which have glass ceramic plates 1 as working surfaces. In the embodiment of Fig. 1, heating regions 2, 3, 4, 5 and 6 are arranged underneath this ceramic plate, and input elements 8 and indicating elements 9 are arranged in the region of a cover frame 7 facing the user of the hob. For this purpose, the frame is somewhat widened in this region. An electronic control system 10 is housed in a rearward region of the hob underneath the plate 1, this region serving as a deposit area.

Side views of parts of this cooker hob are shown in section in Figs. 2 and 3. It can be seen from Fig. 2 that the input element 8 is constructed in the manner of a push-button and is arranged in the cover frame 7 of the cooker hob underneath a resilient cover cap 11. The space requirement for this element 8 is very small by virtue of its construction as a push-button. The heating elements for the heating regions 5 and 6 lie underneath the plate 1 in the vicinity of this element 8, these heating elements being housed in a protective trough 12. Mounted behind this protective trough 12 is a further protective trough 13, in which a mains unit 14 and the electronic control system parts 15 (Figs. 1 and 3), as well as the power amplifiers for the heating power control, are housed. The trough 12 as well as an air space 16 protect the electronic components against the increased temperature of the heating elements. The electronic components are heat-insulated by an insulating plate 22 from the plate 1. Thus, the plate 1 above the electronic control system can readily be used as deposit area for hot cooking vessels.

In the embodiment of Figs. 4 and 5, the cooker hob frame 17 is inclined obliquely forwards in the region of indicating elements 18 and operating elements 19. A transparent pane 20 is arranged in a cut-out of the frame



17 in the region of the elements 18. The frame 17 itself rests on the cooker working plate 21 and carries the glass ceramic plate 1. Fig. 5 shows that the operating element 19

- 5 has the form of an upwardly projecting push-button plunger which is a direct component of a push-button switch or key switch 191. This switch 191 is directly fastened to a circuit board 192, for example, by soldering of electrical connecting elements of the switch to connecting elements or conductor tracks of the circuit board 192. The free end of the push-button plunger 19 projects into an opening 193 of the operating panel or of the frame 17 and pressed into this opening is a cap-like resilient push-knob 194. Through pressing the push-knob and through resilient deformation thereof, the plunger 19 can be axially displaced, whereby a switching operation is initiated. In this case, special transmission push-rods, as provided in known constructions between a push-button switch and push-knob, are not needed. Moreover, no guidance is required for such a plunger-like transmission element. From this results the advantage that assembly and repair are substantially facilitated through reduction in the number of the individual parts.

- Returning to the embodiment of Figs. 1 to 3, a flat, trough-like container 60, shown by chain-dotted lines in Fig. 2, is closed off at least to a large part upwardly by a screening cover 61 and is fastened, preferably detachably, to a boundary plate 62 covering the cooker hob at its base as well as the heating equipment. The entire electronic control equipment for the individual cooking places is arranged in this container 60 in the case where no space is present for the equipment in the interior of the cooker hob, thus above the boundary plate 62, i.e. when the entire space is occupied by heating equipment and the like. As also shown in chain-dotted lines in Fig. 2, electrical and/or electronic assemblies inclusive of a mains connection unit are arranged in the interior of the container 60, for example on a circuit board 63, and are connected through flexible electrical lines in the interior of the hob with the operating elements. As Fig. 2 shows, a heat-retarding hollow space 64 is disposed between the cover 61 and the plate 62.

- In the embodiment of a cooker hob according to Fig. 6, actuating elements 28 and indicating elements 29 are housed in the side of a cooker hob frame 27 facing the user. As in the case of the embodiment of Fig. 1, two input elements constructed in the manner of push-buttons are associated in pairs with a heating region of each cooking zone, although not on either side of the indicating element 29 but on the same side of this element. The heating power of each cooking region is increased by one of the elements of the associated pair and lowered by the other element.

The electronic control system is housed underneath the hatched region, which serves as deposit area.

- A modified arrangement of heating regions 32, 33, 34, 35 and 36 is shown in Fig. 7. In this case, a deposit region 37, under which the electronic control system is housed, is arranged laterally beside the heating regions.

- Fig. 8 shows a cooker hob with a ceramic plate 1, in which input elements 48 and indicating elements 49 are housed in a lateral strip of a cooker hob frame 47. Immediately alongside this strip is a deposit region 46, underneath which the electronic control system is arranged.

- The Fig. 9 shows a cooker hob without standard input elements for the heating areas 52, 53, 55 and 56. In this case, these elements are arranged in their own control panel (not shown), which can be united with a cooker control. In order to enable utilisation of both heating regions 52 and 53 together with the housing region 54 as a combined heating surface, a respective input element 58 constructed in the form of a push-button is provided in a rear corner region in the plate 1 of the hob. Provided in the other rear corner region of the plate 1 is a luminous indicator 59, which for example signals the presence of residual heat in the plate 1. The region 60 in the present case serves as a warming area.

- The Fig. 10 schematically shows a circuit for the heating power control with the use of a microprocessor  $\mu P$ . A component part of each of the afore-described push-button input elements is a set of switch contacts S which, as evident from Fig. 11, is connected in series with a diode D and connects a respective one of drive lines AL and with a respective one of input lines EL at an intersection SD' thereof. The output lines AL are driven one after the other through the microprocessor. When one of the contacts S at an intersection points SD' is closed, then this signal is fed back to the input of the microprocessor. As these signals, by virtue of the use of input elements in the form of push-buttons, are not subject to any significant damping, they are present clearly and in full strength over the entire line conduction and thus at the input of the microprocessor. For this reason, the microprocessor and the following circuit components can also be arranged remote from the switch contacts S at the intersection SD' in the input matrix without giving rise to disturbing influences of any significance over correspondingly long lines. Resistances R1 reduce the current of the output pulses of the microprocessor to the permissible input level. Resistances R2 serve to keep the inputs of the microprocessor at a defined reference potential when the switch contacts are opened.

- In the illustrated example, the indicating elements are provided by four seven-segment indicating displays SD. These can be driven

directly from the microprocessor.

The microprocessor processes the input criteria, which are recognised through differently long pressing of the operating elements and thereby through differently long closing of the switch contacts S, for the heating power control and forms appropriate control pulses. These are delivered to relays R, which as power amplifiers control the current for the heating elements of the individual heating regions.

#### CLAIMS

1. A cooker hob comprising means defining a plurality of heating zones, and at least one operating element associated with at least one of the zones for control of the heating thereof by way of heating power control means, said at least one operating element comprising a push-button arranged in a narrow region of the hob and the control means being arranged in a position remote from that of the operating element and being connected thereto by electrical conductor means.
2. A cooker hob as claimed in claim 1, the means defining the cooking zones comprising a glass ceramic plate.
3. A cooker hob as claimed in either claim 1 or claim 2, wherein said at least one operating element is arranged in an edge region of the hob.
4. A cooker hob as claimed in any one of the preceding claims, comprising a plurality of such operating elements arranged in a plurality of edge regions of the hob.
5. A cooker hob as claimed in any one of the preceding claims, wherein the or each operating element is arranged in a cover frame of the hob.
6. A cooker hob as claimed in any one of the preceding claims, comprising a plurality of such operating elements arranged in pairs.
7. A cooker hob as claimed in any one of the preceding claims, comprising indicating means arranged in the immediate proximity of said at least one operating element.
8. A cooker hob as claimed in claim 6, comprising respective indicating means arranged between the operating elements of each pair.
9. A cooker hob as claimed in any one of the preceding claims, wherein said means defining the heat zones further defines a deposit zone for utensils, the control means being disposed underneath the deposit zone.
10. A cooker hob as claimed in claim 9, comprising heat insulating means arranged between the control means and the deposit zone.
11. A cooker hob as claimed in any one of the preceding claims, comprising a respective heating device arranged underneath each of the heating zones, the heating devices being disposed in heat insulating housings.
12. A cooker hob as claimed in claim 11, wherein the housings are so spaced from the control means that a heat insulating air space is present between the housings and the control means.
13. A cooker hob as claimed in either claims 11 or claim 12, wherein the housings are so spaced from the or each operating element that a heat insulating air space is present between the housing and the operating element or elements.
14. A cooker hob as claimed in claim 1 in combination with a separate operating panel, wherein the panel is provided with further operating elements for control of the heating of the heating zones by way of the control means.
15. A cooker hob as claimed in any one of the preceding claims, comprising a plurality of such operating elements, each operating element comprising a set of switching contacts connected in series with a decoupling diode to effect interconnection of a respective pair of intersecting conductor lines of a conductor matrix of the control means.
16. A cooker hob as claimed in claim 15, the control means comprising a microprocessor connected at inputs thereof to the column lines of the matrix and at outputs thereof to the row lines of the matrix.
17. A cooker hob as claimed in claim 16, comprising resistance elements arranged in the lines connected to the microprocessor inputs.
18. A cooker hob as claimed in either claim 16 or claim 17, comprising means for applying a reference potential by way of resistance elements to the lines connected to the microprocessor inputs.
19. A cooker hob as claimed in any one of the preceding claims, the control means being arranged in trough-like housing means fastened to a cover plate at the lowermost side of the hob.
20. A cooker hob as claimed in claim 19, the housing means being detachably fastened to the cover plate.
21. A cooker hob as claimed in either claim 19 or claim 20, the housing means comprising an upper screen element so arranged at a spacing from the cover plate that an insulating air space is present therebetween.
22. A cooker hob as claimed in either claim 19 or claim 20, the housing means comprising an upper screen element arranged at a spacing from the cover plate, and heat-retarding means being disposed in the space between the screen element and the cover plate.
23. A cooker hob as claimed in claim 1, comprising a plurality of such operating elements mounted on a circuit board and each comprising a push button member projecting into a respective opening in an operating panel disposed at a spacing above the circuit

board, the panel being provided in each opening with a resilient cover element deformable to operate the associated push button member.

5 24. A cooker hob as claimed in claim 23, wherein each of the operating elements comprises switching means electrically connected to printed conductor tracks of the circuit board by soldering.

10 25. A cooker hob substantially as hereinbefore described with reference to Figs. 1 to 3 of the accompanying drawings.

26. A cooker hob substantially as hereinbefore described with reference to Figs. 4 and

15 5 of the accompanying drawings.

27. A cooker hob substantially as hereinbefore described with reference to any one of Figs. 6 to 9 of the accompanying drawings.

20 28. A cooker hob as claimed in any one of the preceding claims and substantially as hereinbefore described with reference to Figs. 10 and 11 of the accompanying drawings.

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